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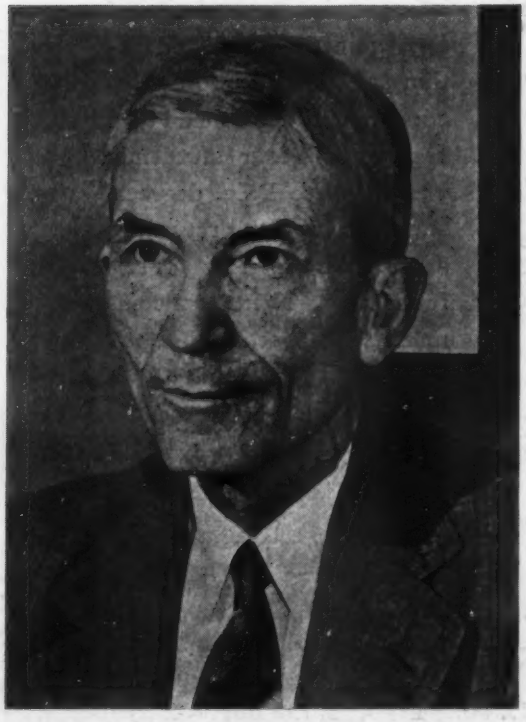

DR. E. F. KELLY
(see "Our Cover", p. 250)

JULY
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OUR COVER

DR. E. F. KELLY

CHARACTERISTIC of the far-sighted wisdom and devotion to his profession is the announcement by Dr. E. F. Kelly that he will relinquish the exacting duties of the Secretaryship of the American Pharmaceutical Association not later than the annual meeting of 1945.

This decision follows a pattern set by men like Dr. James H. Beal who release themselves from specific responsibilities at a time in life when richness of experience, maturity of judgment, nation-wide acquaintanceship, and the confidence and trust of everyone, makes possible many more years of inspirational leadership in pharmacy.

Dr. Kelly has always had the rare gift of creative work. He knows how to face honest critics and use them in helping correct revealed weaknesses; he is able to stimulate cooperation and point the way to those who desire to help a worth-while cause but need wise guidance; he has the qualities which bring loyalty and devotion to himself and to his programs.

An adopted son of Maryland, he has won and held the affection and unquestioning support of the pharmacists, physicians and officers of his state, from the humblest clerk in a country drug store to the members of the Legislature, the Governor of Maryland and the President of the State University.

With this clear understanding and vision of the educational and professional needs and legitimate place of pharmacy in Maryland and with consummate skill, he led the move to build and finance the School of Pharmacy of the University and he did this, an accomplishment which many would consider enough for one lifetime, while guiding the national program of the American Pharmaceutical Association at Washington.

A visitor or a resident of Washington who passes the impressive panorama of new Government buildings on Constitution Avenue and who suddenly comes upon the centre of American pharmacy, where are housed the American Pharmaceutical Association offices, would be strikingly impressed by the perfection and charm of the pharmacy headquarters building. A high official in Government circles, but outside of pharmacy, recently said that he believed it the most beautiful building in Washington.

Those who are familiar with the facts know that the location of the building, one of the most choice in the city, and the securing of the help and architectural guidance of John Russell Pope, probably the most eminent architect of America in recent years, were won for the Association by the convincing arguments of Secretary Kelly, backed by his sincerity and friendliness, and his faith and belief in pharmacy as an important factor in the national health program.

Two other physically observable accomplishments which reflect the creative genius of Dr. Kelly are the American Pharmaceutical Association Laboratory, established as a centre for pharmaceutical research in drug standardization, and the Practical Pharmacy Edition of the American Pharmaceutical Association Journal. Dr. Kelly had long recognized the need for a centre where could be assembled professional knowledge and activities and from which it could be freely distributed for the use of retail or hospital pharmacists, manufacturers or teachers. This combination of experimental laboratory with a competent scientific staff, and a widely distributed and unbiased journal, are essential to the stimulation and growth of the profession.

Again, those who know recognize that back of the laboratory and the journal have been the inspiration and leadership and financial wizardry of Secretary Kelly and the complete confidence all have in his wise and unselfish guidance. However, the existence of one of our leading colleges of pharmacy, the National Headquarters for American pharmacy, its laboratory, and the Practical Pharmacy Edition are only physical evidences of Professor Kelly's work. They stand out

as symbols of the man. The really remarkable services of Dr. Kelly are through his daily personal contacts with hundreds of people who consult him about pharmaceutical matters. This service as advisor and counselor has continued throughout his professional life but it has grown in importance and effectiveness from year to year until today he is called into conferences and for decisions and advice in almost every important pharmaceutical field.

Professor Kelly is not the subtle type; he is not a small politician; he does not win by patronage or influence; he does not ruthlessly eliminate those who do not agree or who actively oppose him, but instead he quietly presents his opinions, which always express what he believes to be fundamentally sound, honestly right, and judicially wise. Frequently he clinches an argument by repeating a homely story all can understand and which proves correct the principle for which he is fighting. Again he may quote an axiom or saying of his father, remembered from boyhood days on the farm in North Carolina, the kind of wisdom and truth upon which the pioneers of America built this nation.

Dr. Kelly has true courage and has given ideal leadership; he has known how to face success in high places and retain humility; he has faced disaster and personal sorrow unflinchingly. His friends, who are legion, hope that he may be able to continue his influence for the good of American pharmacy for many years to come.

E. Fullerton Cook.

E D I T O R I A L

ACCELERATION AS A CONTINUED POLICY FOR PHARMACEUTICAL EDUCATION

ACCELERATION of college study for students of pharmacy was instituted by most, if not all, of our colleges as a war-time measure. A number of reasons for adopting acceleration were offered when this program was begun. It was stated that such a move would supply pharmacists for the armed services more rapidly and that the civilian supply of much needed pharmacists would be improved. The feeling that students would be subject to criticism if on vacation was also a factor. However, for those who will face the truth, these reasons are either insignificant or at least subordinate to the primary cause of the original need for acceleration. Colleges of pharmacy were compelled to accelerate lest they lose a major proportion of their male students through Selective Service. They chose the only possible course of action since it was only fair that the colleges should do everything possible to prevent the interruption of the education of a student who had begun his course in a *bona fide* manner with no thought of draft evasion. The wisdom of such action by the colleges has been borne out by the observation that most good students who were in college at the time of our entry into the war were deferred until their college training was completed. This in itself justifies the adoption of acceleration when it was done.

Today we have a vastly different situation in pharmaceutical education. Now no student is subject to deferment unless he is physically disqualified, and our students of pharmacy are almost entirely boys under 18, those with some physical disability, and young women. The question naturally arises whether acceleration is desirable and feasible for these students and for those who will enroll in college in the post-war era. Students who are today in college are of little or no importance to the armed services, so that hastening their education can be of no value to these services. The very limited number of students who will graduate in the next few years is a serious problem to the entire drug industry, but turning them out a few

months sooner or later cannot alter this situation to any appreciable degree. From the standpoint of pharmacy's manpower problem no tangible improvement can be expected through continued acceleration. Readjustment and redistribution of pharmaceutical personnel is the only promising means of relieving this situation.

The case, then, for or against acceleration should be based almost entirely on whether this program is educationally and socially the optimum plan for training young men and young women as both pharmacists and future citizens for our world of tomorrow. We think that it is not.

Those educators who will be honest with themselves must admit that now the finished product of our colleges is not the well-rounded, broadly trained graduate of the pre-war era. Today both teachers and students show signs of mental and physical fatigue. Teachers who at one time faced their new class with inspiration and dedication now, in many instances, feel that their lectures are assuming all the characteristics of recordings to be turned off and on as needed. There are those who envision a complete change in our educational procedure. The intimate contact between teacher and student is to be replaced by sound pictures, and all the spiritual values once gained by hearing a great teacher give his lectures are to be lost. They shall be replaced by robot instructors, training then what will become robot technicians. This is not true education and it, furthermore, leads to fascism, as we have already learned only too well.

Education in the true sense is not simply turning out technicians who can perform detailed tasks with certainty and efficiency. It is a process which is both biological and spiritual, and as such it cannot be squeezed into a certain interval of time however urgently we might wish it.

To attempt to hasten the process of true education is as hazardous as the administration of endocrines to a normal youth in order to bring about more rapid maturity. Pharmacy students in particular are impaired in their development by acceleration, since summer periods were formerly spent, at least in part, in getting some practical experience in retail pharmacy. The lack of this drug store work produces a noticeable change in the student, not only in his mastery of dispensing technic, but also in his understanding of human relations.

One frequently hears the argument that returning service men will demand acceleration to prepare them rapidly for the profession.

This sentiment seems to be akin to wishful thinking on the part of those who, for other reasons, wish to see acceleration continued. Our boys, if we believe what they write us, want "normalcy" more than all else, and with financial aid from our government regular instruction will be no hardship. They have on the other hand suffered hardship and fatigue from the pressure of war. War in itself is acceleration, and to relax to normal campus life will help return them to a normal emotional outlook and mental stability.

As a final argument against acceleration we have the social problem of increasing in the reconversion period the number of graduates seeking positions. The present serious shortage of manpower could easily change in a few months to oversupply. We should not encourage the return of that period when the government by means of the CCC took care of thousands of unemployed and disillusioned youths.

The case against continued acceleration is indeed strong. Several of our leading colleges are already committed to its abandonment. The American Association of Colleges of Pharmacy should give serious consideration to a definite policy regarding this problem since only chaos will result unless the colleges act in some uniform manner. Let us not do that which is merely expedient, but rather that which is educationally and socially sound.

L. F. Tice.

MOLDS AND YEASTS IN DAIRY PRODUCTS

By Louis Gershenfeld and Werner W. W. Ruthenberg **

Introduction

A GREAT deal of attention is being paid by the Dairy Industry to the occurrence, action and control of bacteria. Although just as important, molds and yeasts have not received as yet the same study by these industries. This is probably due to the fact that there is little indication that moldy or yeasty products cause diseases as some bacteria may. From a sanitary and economic viewpoint, however, the close study of molds and yeasts and their action upon dairy products is of great importance.

Yeast and mold spores are widely distributed. They are found in and on feeds, manure, soil, decaying vegetables and on animal matter of every description. They are suspended in the air and are part of the fine dust which is always present in the atmosphere and which is spread widely by air currents.

Thus milk easily becomes contaminated with yeast and mold spores. A large variety of molds and yeast is found in all dairy products. Some forms are capable of growing in milk freely, others grow very feebly. They bring about many changes, some of which are desirable, others very undesirable. As a rule, their action is very slow upon milk. Some species ferment lactose; some proteolyze rapidly; and others have a tendency to produce an alkaline reaction.

The molds generally occur at or near the surface of the products since they require oxygen. However, the flavor of the product underneath the mold is generally affected.

The mold most frequently found in dairy products is *Oospora lactis*. This mold occurs often on the surface of old milk, cream, sour cream, cheese and butter.

The yeast and mold counts provide a reliable index of the sanitary efficiency. High yeast and mold counts are generally due to improper cleaning, contamination of starters, unclean and drafty surroundings and insanitary practices.

** Department of Bacteriology, Philadelphia College of Pharmacy and Science.

The yeast and mold counts in particular should serve as a check on the quality of cultural products such as butter, buttermilk, sour cream, and cheeses. A number of macroscopic, microscopic and cultural methods have been proposed and are used for the study and determination of yeasts and molds.

J. D. Wildman of the Microanalytical Division, U. S. Food and Drug Administration, has proposed a microscopic method for butter (1). In this method, the butter is mixed with a hot gum solution and this mixture is then examined by the Howard technique (2).

A method for estimating molds in cream is suggested by Wildman (1) in which the cream is mixed with a hot methylene blue borax solution. Molds present will agglutinate into blue masses which can be measured.

John suggests a method for determining molds and yeasts in butter (3). Microplates are made, stained, and examined.

Redfield's microscopic method which is used especially for butter (4) is similar to the Breed method for bacteria.

The methods most commonly used for the determination of yeasts and molds are the cultural or plating methods. A number of culture media have been recommended and are used in the determination of molds and yeasts in dairy products.

Purpose

The purpose of this study was:

1. To find a suitable method of examining cultured dairy products for molds and yeasts.

2. To determine the frequency of the occurrence of molds and yeasts in various cultured dairy products.

3. To discover the causes of the mold and yeast contamination, and offer suggestions for prevention.

Experimental Procedure

In studying the plating methods the following media were used:

1. Dehydrated Potato Dextrose Agar—Difco.
2. Dehydrated Sabouraud's Dextrose Agar—Difco.
3. Dehydrated Malt Agar—Difco.
4. Dehydrated Wort Agar—Difco.

To obtain a definite pH in these various media, sterile tartaric acid solution (10 grams U. S. P. tartaric acid dissolved in 100 cc. of distilled water) was added before use to the melted agar.

The pH was determined by means of a potentiometer. The following technique was employed:

Twenty cc. each of sterile melted agar were placed in 10 clean test tubes. These tubes were kept in a water bath at 45° C., and to them were then added different amounts of the sterile tartaric acid solution.

Tube No. 1 received no acid. Tube No. 2 received 0.1 cc. of tartaric acid. Tube No. 3 received 0.2 cc. of tartaric acid. Tube No. 4 received 0.24 cc. of tartaric acid. Tube No. 5 received 0.28 cc. of tartaric acid. Tube No. 6 received 0.32 cc. of tartaric acid. Tube No. 7 received 0.36 cc. of tartaric acid. Tube No. 8 received 0.40 cc. of tartaric acid. Tube No. 9 received 0.44 cc. of tartaric acid. Tube No. 10 received 0.48 cc. of tartaric acid.

The pH of each tube was then determined.

The original pH of the various media was as follows: (1) Potato Dextrose Agar—5.6 to 5.98; (2) Sabouraud's Dextrose Agar—5.6 to 6.12; (3) Malt Agar—5.5 to 5.55; (4) Wort Agar—4.7 to 4.90.

In order to obtain a pH of 3.5, which is the one recommended for the highest yeast and mold count, the following quantities of tartaric acid solution were added to each 100 cc. of media: (1) P. D. A.—2.0—2.4 cc.; (2) S. D. A.—2.0—2.4 cc.; (3) M. A.—1.6—2.0 cc.; (4) W. A.—1.4—1.8 cc.

To determine which one of these media would give the highest count of yeast and mold colonies and prevent the growth of acid producing bacteria, several dairy products, as given in the tables, were plated and poured with these different media.

In plating the sour cream, buttermilk, and butter, 10 cc. portions were transferred to 90 cc. of water by means of a 10 cc. pipette. In plating the cheese, 10 grams were added to 90 cc. of water. All plates were incubated at room temperature (65°-75° F.) for 92 hours. The standard plate count technique was used.

In counting these plates all colonies which showed a profuse growth of hyphae or filaments were classified as molds. All large and smooth surface colonies which were moist and raised were classified as yeasts. Colonies which looked like bacteria were also examined microscopically. Since no bacteria were found at this pH (3.5), all colonies not definitely molds were later on counted as yeasts.

The results are found in the following tables:

TABLE 1 *

Comparative Yeast and Mold Counts (per cc.) of Sour Cream Plated on Various Culture Media Adjusted to pH 3.5

	P. D. A.		S. D. A.		M. A.		W. A.	
Sample	Molds	Yeasts	Molds	Yeasts	Molds	Yeasts	Molds	Yeasts
1	700	0	640	0	680	0	710	0
2	120	5000	68	3500	110	4600	120	4800
3	10	10	7	5	10	7	11	9
4	90	0	65	0	86	0	88	0
5	50	50	40	31	48	39	51	48
6	40	0	22	0	42	0	37	0
7	10	0	4	0	8	0	8	0
8	60	10	36	6	51	12	56	15
9	10	0	5	0	6	0	7	0
10	100	0	49	0	88	0	89	0

TABLE 2

Comparative Yeast and Mold Counts (per cc.) of Buttermilk Plated on Various Culture Media Adjusted to pH 3.5

	P. D. A.		S. D. A.		M. A.		W. A.	
Sample	Molds	Yeasts	Molds	Yeasts	Molds	Yeasts	Molds	Yeasts
1	0	195	0	15	0	125	0	135
2	0	165	0	13	0	110	0	135
3	0	650	0	300	0	540	0	580
4	0	580	0	220	0	490	0	520
5	0	29	0	22	0	24	0	28
6	0	650	0	120	0	650	0	400
7	0	600	0	150	0	680	0	500
8	0	19	0	10	0	13	0	12
9	0	126	0	10	0	97	0	78
10	0	116	0	8	0	80	0	95
11	0	39	0	30	0	33	0	32
12	0	15	0	1	0	7	0	7
13	0	23	0	2	0	21	0	36
14	0	33	0	6	0	31	0	24
15	0	17	0	10	0	15	0	15
16	0	12	0	0	0	4	0	6
17	0	97	0	40	0	72	0	75
18	0	100	0	57	0	85	0	80
19	0	..	0	130	0	0	0	0
20	0	490	0	70	0	145	0	450
21	0	460	0	75	0	175	0	380
22	0	48	0	4	0	16	0	25
23	0	1000	0	550	0	980	0	1200
24	0	1500	0	750	0	1300	0	1500
25	0	182	0	25	0	175	0	195
26	0	164	0	65	0	161	0	178

* The various culture media are abbreviated in this and further tables as follows:
P. D. A.—Potato Dextrose Agar. S. D. A.—Sabouraud's Dextrose Agar. M. A.—Malt Agar. W. A.—Wort Agar.

TABLE 3

Comparative Yeast and Mold Counts (per Gm.) of Cream Cottage Cheese Plated on Various Culture Media Adjusted to pH 3.5

	P. D. A.		S. D. A.		M. A.		W. A.	
Sample	Molds	Yeasts	Molds	Yeasts	Molds	Yeasts	Molds	Yeasts
1	46	130	36	110	36	78	45	65
2	25	360	21	310	24	290	24	320
3	30	250	22	200	26	210	27	240
4	0	250	0	170	0	190	0	210
5	120	900	100	850	120	800	110	800
6	40	600	31	450	36	520	38	510
7	0	200	0	140	0	170	5	165
8	50	150	28	130	38	145	39	155
9	10	90	6	71	8	95	13	94
10	500	45000	380	38000	490	41000	510	43000
11	9	35	6	30	7	36	8	36
12	8	26	7	30	5	35	6	38

The observations reveal that the Potato Dextrose Agar yielded the highest count and the colonies were generally larger than those on the other media. Wort and Malt Agar gave somewhat lower results. Sabouraud's Dextrose Agar gave the lowest results.

In order to note the frequency of the occurrence of molds and yeasts in cultured dairy products a number of samples of cultured sour cream, butter, and cream cottage cheese were examined for the presence of molds and yeasts by plating on Potato Dextrose Agar which was found to give the highest count.

The results are found in the following tables:

TABLE 4

Yeasts and Mold Counts of Buttermilk (per cc.) Plated on Potato Dextrose Agar

Sample	Molds	Yeasts
1	0	0
2	0	0
3	0	750
4	0	710
5	0	850
6	0	740
7	0	1800
8	0	2100
9	0	2300
10	0	2170
11	0	0
12	0	2000
13	0	0
14	0	15000
15	0	24000
16	0	120
17	0	0
18	0	10
19	0	25
20	0	0
21	0	0
22	0	30
23	0	0
24	0	10

TABLE 5

Yeast and Mold Counts of Cream Cottage Cheese (per Gm.) Plated on Potato Dextrose Agar

Sample	Molds	Yeasts
1	460	130
2	70	70
3	30	140
4	0	10
5	10	20
6	25	360
7	30	250
8	0	250
9	120	900
10	40	600
11	0	200
12	50	150
13	1500	5000
14	20	180
15	10	90
16	0	10
17	1000	120000
18	1800	300000
19	60	500
20	10	15

TABLE 6

Mold and Yeast Counts of Butter Plated on Potato Dextrose Agar

Sample	Molds	Yeasts
1	0	5
2	0	8
3	5	12
4	0	35
5	10	120
6	0	10
7	15	18
8	11	22
9	0	3
10	0	2

TABLE 7

Yeast and Mold Counts (per cc.) of Sour Cream

Molds	Yeasts	Molds	Yeasts
0	0	360	30
0	0	450	0
2	0	60	10
700	0	1200	0
120	5000	100	0
10	10	0	0
90	0	0	0
50	50	0	0
40	0	10	0
10	0	0	0

After finding a suitable method for the examination of molds and yeasts in dairy products, and observing that molds and yeasts are found in these products, the various causes which may bring about this undesirable contamination were then studied. Since the sour

cream showed at the time a heavy mold and yeast contamination, the study was confined to sour cream. It must be remembered, however, that these contaminations may occur suddenly, cause a great deal of trouble, and then disappear just as suddenly.

In order to find the points at which the contamination occurred, samples were taken at the various steps of the process, including samples of the raw cream. The results for raw cream were as follows:

Sample	Molds per cc.	Yeasts per cc.
1	240	120
2	10	0
3	150	15
4	1800	65
5	5	10

Samples of the pasteurized cream taken from the holding tank showed the following results:

Sample	Molds per cc.	Yeasts per cc.
1	0	0
2	0	0
3	0	0
4	10	2
5	0	0

The next samples were taken from the cooler after the cream had been viscolized.

Sample	Molds per cc.	Yeasts per cc.
1	0	0
2	0	0
3	2	0
4	8	0
5	0	1

The mother culture (culture supplied by the Plant Laboratory) never showed molds or yeasts.

The cultures prepared in the plant from the Plant Laboratory cultures had the following count:

Sample	Molds per cc.	Yeasts per cc.
1	0	0
2	3	1
3	4	2
4	24	6
5	5	0

Following are the results on inoculated samples taken from the incubating tank:

Sample	Molds per cc.	Yeasts per cc.
1	0	0
2	10	10
3	40	0
4	320	24
5	40	5

The finished product had these counts:

Sample	Molds per cc.	Yeasts per cc.
1	0	0
2	10	10
3	40	0
4	320	24
5	40	5

Sterility Tests

In addition to the samples taken during the manufacturing process, sterility tests were performed upon the equipment and environment. The following technique was used:

Twenty cc of a 0.01% sodium thiosulfate solution were placed in a test tube. Into this solution was placed a cotton swab attached to a wire. These tubes were then sterilized at 15 pounds pressure for 20 minutes. Swabs were made from the different pieces of equipment and the walls of rooms.

The following results were obtained:

	Sample	Molds per cc.	Yeasts per cc.
Pasteurizer	1	0	0
	2	0	0
	3	1	2
	4	3	0
	5	1	1
Cooler	1	0	0
	2	0	0
	3	2	2
	4	2	0
	5	0	0
Incubating Tank	1	0	0
	2	2	1
	3	0	0
	4	0	1
	5	0	0
Filler	1	0	0
	2	40	5
	3	0	1
	4	4	6
	5	2	4
Lid of Filler	1	0	6
	2	20	0
	3	0	0
	4	2	2
	5	0	0
Hood over Bottles	1	10	0
	2	50	30
	3	20	10
Capping Machine	1	100	120
	2	1500	1500
	3	20	5

	Sample	Molds per cc.	Yeasts per cc.
Empty Bottles	1	0	0
	2	0	0
	3	0	0
	4	0	2
	5	0	0
Culture Cans	1	100	20
	2	20	5
	3	0	0
	4	0	0
	5	25	35
Walls of Culture Room	1	7000	0
	2	3500	0
	3	4500	20
Ceiling over Incubator Tank	1	15	0
	2	2	0
	3	35	10

From the foregoing, the following findings are apparent:

The cream taken from the pasteurizer and cooler was always negative. The cream from the incubating tank showed occasional contamination. The finished product was always contaminated with yeast and molds.

This seems to prove that pasteurization was satisfactory and no contamination occurred at the viscolizer since the results of the cooler samples were negative. However, the first contamination seems to occur in the incubating tank. The culture prepared in the plant and added to the cream in the incubating tank also showed contamination.

If we consider the sterility tests we find that the cleanliness and sterility of the pasteurizer, viscolizer, cooler and incubating tank were satisfactory. Heavy contamination was found in the hood over the empty bottles, on the walls of the culture room, and on the ceiling over the incubating tank.

The cans in which the culture was prepared were not sterile. This was probably one of the main causes of the contamination. The empty bottles were nearly always sterile.

In order to eliminate these probable causes, the following steps were taken:

1. The walls of the culture room, the ceiling over the incubating tank and the hood over the bottles and the capper were washed with chlorine solution.

2. Special new cans were employed in the preparation of the culture. Cans were kept covered during the incubation period.

3. Detailed instructions were given for sterilizing the filler and lid. Parts of the equipment which were not reached by the

chlorine rinse (100 p. p. m.) were sprayed with chlorine solution (200 p. p. m.).

After these steps were taken swabs were made and the following results obtained:

	Sample	Molds per cc.	Yeasts per cc.
Filler	1	0	0
	2	2	1
	3	1	1
Filler Lid	1	0	0
	2	0	0
	3	2	2
Hood over Bottles	1	3	0
	2	0	0
	3	2	3
Capping Machine	1	5	0
	2	0	0
	3	10	8
Culture Can	1	0	0
	2	0	0
	3	2	1
Walls of Room	1	6	0
	2	10	2
	3	5	0
Ceiling	1	0	0
	2	1	2

Shortly after these precautions had been taken, the contamination of the finished product decreased and very soon disappeared altogether.

	Sample	Molds per cc.	Yeasts per cc.
Finished product before special care	1	10	0
	2	10	10
	3	55	5
	4	350	45
	5	50	10
During examination	1	10	60
	2	25	5
	3	100	10
	4	150	50
	5	5	10
After cleaning and supervision	1	10	10
	2	100	0
	3	10	0
	4	15	3
	5	22	15
	6	5	0
	7	0	0
	8	10	0
	9	0	0
	10	30	30
	11	0	0
	12	10	10
	13	0	0
	14	0	0
	15	0	0

From the foregoing results, the cause of the contamination is attributed to the following:

1. Improper sterilization of equipment.
2. Exposure of cream to air.
3. Contaminated cultures.
4. Excess of molds and yeasts in processing plant.

In addition to plate counts, miscroscopic smears were made on the sour cream as received and on sour cream which was kept at 70° F. for 24 hours. These results coincide with the plate count and serve as a quick indication of the absence or presence of molds and yeasts as shown by the following table.

In case of heavy contamination, mold growth was visible to the naked eye within 24 hours if incubated at 70° F. For light contamination, the microscopic examination is only of slight value. A few molds and yeasts may not be detected.

The microscopic examination, however, is very valuable for highly contaminated samples, which may develop off-flavors and even spoil.

Finished Product

Plate Count		Presence of Molds or Yeasts after 24 hours at the following temperatures: Microscopical Examination		Macroscopical Examination
Molds per cc.	Yeasts per cc.	40° F.	70° F.	70° F.
10	0	—	—	—
10	10	—	—	—
55	5	—	+	—
350	45	+	+	+
30	0	—	+	—
80	5000	+	+	+
250	20	+	+	+
1200	0	+	+	+
2500	15	+	+	+
100	10	+	+	+
10	0	—	—	—
100	0	+	+	—
10	0	—	—	—
15	3	—	—	—
22	15	+	+	—
5	0	—	—	—
0	0	—	—	—
10	0	—	—	—
0	0	—	—	—
50	250	+	+	—
10	100	—	+	—
30	30	+	+	—
0	0	—	—	—
10	10	—	—	—
0	0	—	—	—
0	0	—	—	—
0	0	—	—	—
0	0	—	—	—
0	0	—	—	—

Summary

Different cultured dairy products were plated on Potato Dextrose Agar, Sabouraud's Dextrose Agar, Malt Agar, and Wort Agar, in order to find the medium which would give the best and most uniform results.

Potato Dextrose Agar was found to be the most suitable. This medium was used to determine the mold and yeast contamination of Buttermilk, Cream Cottage Cheese, Butter, and Sour Cream.

A thorough study was made on the Sour Cream to determine the cause of the contamination. By using the Line Run test the points of contamination were revealed.

Microscopic examinations of the Cream were made immediately after its arrival and after incubating it for 24 hours at 70° F.

Conclusions

1. Of the various media employed, Potato Dextrose Agar was found to be the most desirable for estimating molds and yeasts.
2. Cultured products vary greatly as to the number of molds and yeasts they contain.
3. Very high mold and yeast counts were obtained in many cases. This contamination often occurs suddenly, and disappears just as suddenly.
4. The microscopic method can be employed as a quick check on the presence or absence of contamination by yeasts and molds. Incubating the product at 70° F. overnight will show quickly any contamination: macroscopically, if heavy; microscopically, if only slight.
5. The following seem to be the principle causes of the contamination:
   a. Improper sterilization of equipment and utensils.
   b. Unnecessary exposure to air.
   c. Contaminated culture.
6. This contamination can be controlled and avoided by proper care and proper supervision.

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FEEDING FOLKS AT WAR

By T. Swann Harding

IF you are human, and we might as well go on that assumption as the writer imagines that he is, you get away with something like three-quarters of a ton of food a year. That runs in the neighborhood of four pounds a day. Naturally only something like half that is really food, the rest being water. Also, naturally, you may not eat at all; a tremendous lot of it gets wasted.

During the period between 1909-13 and 1935-39 our national food habits changed some, though probably not as much as you might expect. In general we came to eat less cereals, potatoes, and meat, and more fruit, vegetables other than potatoes, dairy products, eggs, sugar, fats, and oils. At about that point war moved in on us. After that our food requirements and supplies changed rapidly and they are not through changing by any means.

By now it has dawned upon us that food is the fundamental munition of war. Without food it is almost impossible to go out and efficiently slay other people and destroy their property. It is just about as impossible to maintain health without food while they try to kill you and destroy your property. It is absolutely essential that fighters be fed just as well as possible and non-fighters as well as is necessary to maintain health and morale.

To our minds the German food policy is a pretty diabolical thing. But, however ruthless, it has been admirably suited to war winning. It consisted primarily in making farming just as efficient as possible by having it produce the commodities that would provide the nutritive elements of an adequate diet with the least strain on agricultural resources. An opulent diet was reserved for fighters and the "big-shot" politicians. A fully adequate diet was provided for all non-fighting members of the "Master Race."

The larders of conquered nations were systematically despoiled. Conquered peoples were placed upon fairly adequate diets, insofar as they could or would aid the Master Race in setting up the New Order. Insofar as they would not do so, they were starved into submission or death as a matter of policy. This farm and food program has enabled

Germany to face even this present year of the war better fed than Britain. It is realistic, however cruel.

Meanwhile our own food obligations have rapidly increased. Not only have we a but slightly diminished civilian population with enormously increased purchasing power to satisfy; we also have many armed men in our own forces and many fighters and civilians among our allies to feed. Even a nation so rich in agricultural resources as ours could not undertake this job without showing strain.

What we require now is a complete rationalization of our food-producing industry from soup to seed. What will this mean?

It means first that farmers must concentrate upon essential crops. Those crops were in 1942 sources of animal protein for a great many people in Britain and some fat and other energy foods for various allies. Now the point has come where we must undertake to do what Germany did long ago—i. e. to produce those farm commodities which will contain the essentials of an adequate diet with least strain upon our farm land, labor, machines, and materials.

The production of sufficient food becomes increasingly difficult the longer any nation is in total war. The nation has only so many arable acres and it can allocate to their cultivation only so much labor, machinery, and materials. The most careful planning is required to effect the necessary results and, even then, the weather, for reasons of its own, resists man's control.

When we get down to brass tacks, animals turn out to be inefficient producers of human food. In other words, probably not having in mind the well-being of the human race, they do not produce very large quantities of protein and fat as compared with the feed with which they are provided. On the circuit through them this feed loses two-thirds of its calories. For every hundred pounds of protein in their feed, animals turn out only from three to sixteen pounds of protein for human food in the form of meat, milk, and eggs.

However, the food the animal does turn out is of high quality. Its proteins are the best to be had; its fats are extremely nourishing and biologically useful. For the animal, in a sense, concentrates the very much diluted food elements in its feed, and this feed consists in large part of products or by-products that human beings will not or cannot eat.

Normally we derive something like sixty per cent of our proteins from animal sources. That, however, is a luxury, not a necessity, for

we can do very well if only a third of our proteins are of animal origin. The other two-thirds can come from vegetable sources. So can a great deal more of our energy foods than normal. Hence, since animals make considerable drain on farm resources, we can increase our food supply and maintain our dietary standards by producing more of certain vegetable crops.

But just what? Research has shown that early-cut clover will produce very large quantities of protein per acre, much larger than wheat or potatoes. But you could scarcely expect Americans to become rapidly conditioned to eating early-cut, dehydrated clover meal! In other words, whatever we do about this matter, it must be within reason, or it cannot be successful at all.

Sugar beets and sugar cane yield more energy per acre than any other crops, but rice, potatoes, soybeans, and corn all rank high. Soybeans also yield more pretty good quality protein per acre than any other crops, though peas, beans, potatoes, and peanuts rank high. Peanuts are tops in fat production, followed by soybeans and cottonseed. Carrots supply more energy than any other vegetable and grapes more than any other fruit.

Returning to protein, soybeans produce more of it more economically than any other crop. They are much superior in this respect to dry beans, wheat, or corn, while the high-quality protein from chickens, eggs, hogs, and beef cattle is as costly in terms of farm resources as if the protein were derived from carrots or grapes. Even potato protein is cheaper in the use of farm resources than beef protein, while peanuts are three times as efficient as milk in this respect.

Soybeans also have other virtues. They are high in calcium, phosphorus, iron, thiamin, and niacin. When sprouted they provide plenty of vitamin C. They can be used for food in a great variety of ways. You are going to see a great deal more of them in the near future.

The foods that provide the most nutritive units while making the most efficient use of our farm resources are: Milk, cheese, hogs, wheat, corn, oats, potatoes, sweet potatoes, dry beans, soybeans, asparagus, cabbage, carrots, beets, cauliflower, onions, tomatoes, grapefruit, oranges, and watermelons. If you ask why watermelons, the answer is they are rich in iron, vitamin A, thiamin, niacin, and riboflavin.

In more general terms, if we are to concentrate on producing the rations that are cheapest in terms of using farm resources, we must change our diets rather radically. We should increase our consumption of leafy green and yellow vegetables, potatoes, sweet potatoes, dry beans, dry peas, soybeans, nuts, tomatoes, citrus fruits, and whole-milk and its products. We must make significant reductions in our consumption of sugar, meats, fats, and fruits and vegetables other than those above named.

After having concentrated upon raising the food commodities that make the most efficient use of our farm resources, we must try to revamp the awkward, cumbersome system of food processing and food distribution that we have let grow up around us. Frills and artificial price maintenance should go by the boards. Waste, confusion, and inefficiency should be out for the duration at least.

Because food will tend to become more and more scarce the longer the war goes on, it must no longer be unnecessarily processed, wastefully packaged, expensively advertised, exorbitantly priced, and afflicted with dumb-bunny names. Under the monopoly regime that we consumers permitted to flower about us, a breakfast food became a box of air and advertising wrapped in cellophane and given a name you would blush to repeat when cold sober. Some of it was even shot out of guns to step its cost up thirty-five times.

Profits on largely superfluous and certainly dispensable trade-marked foods were enormous, even at the depth of the depression. In 1940 eight manufacturers of cereal preparations also made 99.4 per cent of all sales and paid dividends at a rate of 11 per cent after income tax deductions.

These enhanced profits often resulted from the scientific integration of related lines. The economies of large-scale machine production and improved marketing of foods were largely dissipated in paying big salaries, in providing luxury services, and in other cost items. They did not reach consumers so much as they did shareholders. Marketing and retail outlet facilities quite generally were duplicating, bungling, and cumbersome. In New York City alone the total fruit and vegetable marketing bill was forty-two millions annually, of which eight and a half millions could have been saved had the markets been reorganized on scientific principles.

If we are to be fed adequately these abuses must be righted. Distribution and marketing must be rendered efficient. Meanwhile

consumers must learn to assemble the essentials of a good diet from a considerable number of foods they have been unaccustomed to use before. The diet picture will change constantly. Substitutes must be used to piece out.

For this purpose foods may be divided into seven groups. Some from each group should be eaten daily, but not necessarily the same ones all the time. We should have each day some raw, cooked, frozen, canned green and yellow leafy vegetables. We should also have some oranges, tomatoes, grapefruit, raw cabbages, *or* salad greens. The third group consists of potatoes and other vegetables than those mentioned above, and certain other fruit, eaten raw, dried, cooked, frozen or canned.

Next we should have each day some milk or milk products—fluid, cooked-in, evaporated, or dried; some meat, poultry, fish, eggs, dried beans, dried peas, soybeans, nuts, *or* peanuts to supply protein; some natural, whole-grain or enriched bread, flour, and cereal; and, finally, some butter *or* margarine with vitamin A added. If the foods are properly prepared and selections are made from each group daily the diet will be adequate.

Since home cooking is not always what it should be, other measures may have to be undertaken later. Centralized food-purchasing and preliminary preparation of food for cooking by experts might be in the cards. This would be economical and would also better conserve the nutritive values in foods than a multitude of private domestic kitchens could ever do. Kitchen depots where food could be plucked, shredded, sliced, pared, minced, or otherwise prepared for transportation, and where menus could be made out scientifically, would be a good investment.

From these depots food could then be transported in containers to canteens where it would be cooked and served. Salvage of waste would be concentrated in the preparatory plants where garbage would be cut to a minimum, the irreducible residue being put to good use. The kitchen depots should have bacteriological and chemical laboratories for control purposes. There should be strict standards for the preparation and use of food, the utilization of kitchen space, the condition of containers and equipment, and staff hygiene.

It would then be possible also to prepare and service special diets for workers and others in need of these. Doing this has been found to decrease absenteeism by half and to improve health nearly

a hundred per cent in some instances. Some such system should by all means be instituted if we are to make efficient use of the food we produce with such difficulty under arduous wartime conditions.

Above all waste must be avoided. This waste is of two kinds. Some of it stems from manufacturers themselves.

Even now the production of low-quality, inferior, adulterated, or contaminated food goes on merrily. According to the annual report of the Food and Drug Administration for 1942, ten thousand tons of food products had to be seized that year because of serious contamination with filth. This was largely due to inexcusably careless handling and storage.

Some of the food was salvaged under supervision by Government agents, but several million pounds of it proved unfit for any use whatever. The inspectors also found many insanitary factories. Rotten cheese, watered grape juice, bad oysters, low-fat butter, imitation beverages, and spurious olive oil abounded. We must also end that sort of waste during war.

Then we waste food in the home. A study of the great American garbage pail reveals that, of the four pounds of food daily we are supposed to "consume," an average of nearly a pound winds up in the garbage. Garbage collections therefore represent something like a fifth of the total food "consumed." If allowance is made for actually inedible material, something like 15 per cent of the edible food is still thus wasted. This wastage is highest among vegetables, fruits and baked goods, lowest for meat, bone and fish.

In restaurants, management wastes something between 3 and 8 per cent and customers leave about 6 per cent of the food served on their plates. We can't afford good etiquette now! Nearly a half billion dollars worth of perishable food is wasted annually in retail stores through lack of proper refrigeration facilities. Excessive handling by too careful but careless customers increases this wastage. Heavy wastage also occurs during transport, while, getting back to the farm, much food is never harvested for various reasons.

Food waste between the time of production and the time the food leaves the retail store runs as high as 30 per cent for tomatoes, lettuce and cauliflower. A fourth of the cabbage, spinach and celery and a fifth of the fruits like apples, pears and peaches, is so wasted. Such wastage is relatively low for potatoes, peas, beets and citrus fruits. All told the wastage from farm to garbage pail runs between

30 and 40 per cent of the food produced, the lower figure being a conservative estimate after deduction of inedible matter.

In 1942 we wasted more food in our homes alone than was set aside for Army and Lend Lease requirements. If, in 1943, we had recovered that 30 per cent of the food lost in the garbage pail, it would have been a far greater and easier achievement than bettering 1942 food production by 5 per cent. If we quit wasting that slice of bread per week per home, that would make two million more loaves a week to eat!

If we used that half-ounce of butter we were each accustomed to waste weekly, that would provide sufficient for our armed forces for a year like 1942. Even when a potato is peeled and boiled, from a tenth to a third of its bulk, a large part of its vitamin C, and much of its iron—concentrated close to the skin—goes to waste. So go ahead and squeeze your grapefruit dry from now on. Forget manners and conserve food. Starving the garbage pail is our new American slogan on this sector.

The productive apparatus—industrial or agricultural—is simply a means to an end. That end is a satisfactory technical method of supplying consumer needs for services and goods in correct quantity, quality, grade and size, at fair prices. Neither industry nor agriculture has merit, except insofar as it efficiently provides the goods and services required by the public. That is primary.

Consumers should band together voluntarily, inform themselves, and cease paying for wastes incidental to intensive competitive distribution. They must see that retail outlets become consumer purchasing agencies instead of the manufacturer's selling agencies they have long tended to be.

When it comes to human nutrition we have data on population and on nutrition standards. We know our population age classes and the relative numbers of heavy and light workers. From this information we can calculate the quantity of food necessary to keep all citizens in good health and to enable those who work hard to have the energy they require.

We likewise have information on the composition of the diets that will most economically serve our purposes. We can turn this into estimates of crops and animals required, making due provision for processing, packaging and transporting the food. We can make

such allocations of labor, materials and equipment as will enable us to produce the finished food needed. This is a purely technical problem that must be solved on scientific principles.

Rationing is fundamental. The idea of food rationing is not to pool commodities and gradually enrich the diet. It is to see that each individual gets only the food he or she requires. Certain classes like those in the armed forces and at heavy war work may even get palatable food, but for the rest of us it is a question of the most economical health maintenance possible.

The main consideration is to prevent the malnutrition which leads to illness; it is not to provide palatable and desirable foods. A ration that is scientifically adequate may be dull and monotonous. We must get used to that. We must not waste effort or materials in the production of any food we do not absolutely need. We must concentrate upon the production of foods which make the most efficient use of our farm and non-farm resources.

The food requirements of our armed forces, our industrial workers, and our Allies must be met in full. Thereafter we must make minimum safe provision for rationing food to the remainder of our population at a level which will maintain them in health and enable them to perform the activities assigned them. This means increasing Government direction during the war and the scientific management of the entire food industry.

Total war demands that this industry become efficient from seed to table and provide maximum supplies at minimum drain on our resources. After the war we should consider providing a basic, healthful diet for all citizens, just as we provide free education and free libraries. Food is more fundamental than books or learning. Such provision will necessitate over-all government planning.

This does not mean that the government must produce and supply all the food. Private agencies and cooperatives, working on low fixed profits can do this perhaps even better than government agencies, but the latter must act as an over-all general staff in the food field. During the war we are gaining much experience both in educating consumers and in rationally managing our farm and food industries. This may offer profitable salvage from the conflict to utilize at peace.

ECONOMIC REALITIES

DEMAND GROWS OUT OF PRODUCTION

By Karl Scholz, Ph. D.*

IN a period of business depression, such as we experienced during the thirties, the belief is widely prevalent, that in order to restore prosperity, production must be adjusted to existing demand. To achieve this objective, many concerns restrict output, hoping thereby to maintain stable prices for their products, and thus avoid the consequences of catastrophic price declines. Too much production has come to be viewed by many as a basic cause of business depressions, and therefore the belief that prosperity can be restored by restriction of output, to bring it in line with market demand.

While some firms, in the absence of active competition, may be able to cut down their losses by decreasing production and maintaining prices, when the demand for their products declines, the general practice of such "economic birth control" by all producers can lead only to industrial stagnation, and not to business revival. As workers lose their jobs in one industry, and are not reabsorbed in productive enterprise elsewhere, their payrolls stop. But these payrolls are essential to make their wants effective in markets. In our economy production is not stimulated by need alone, but by individual want, made effective with the aid of money, or ability to pay.

Demand is more than merely wanting something. A person who is hungry may want something to eat, but he can't just go to a restaurant and hope to get a meal (unless it be donated by someone) if he does not have the necessary purchasing power.

Where can he get the ability to pay, which is a primary requisite for making his wants effective? There are a number of alternative ways for him to get the purchasing power. He may either find it, steal it, get it as a gift, or earn it. Counterfeiting, if he can get away

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with it, is really a form of stealing. In the first three of the foregoing instances, a person acquires ability to pay from someone else, who presumably has earned it, and has either voluntarily or involuntarily shared it with him and others similarly situated. Even taxation to finance relief is a form of compulsory sharing of income with those who have earned it.

But the process of earning something implies giving something in exchange for what one gets. From the business man's viewpoint, the costs of production which he incurs express his judgment of the value of the goods produced, in terms of what he paid for their production (including an implied payment for his services as business organizer and manager). From the standpoint of those who get these cost payments, whether in the form of wages, salaries, bonuses, rents, dividends or interest, they represent their income, their purchasing power, with the aid of which they can make their wants felt in markets. When these payments are curtailed or stopped by slackening production, effective demand is reduced accordingly. The unemployed may for a time live by spending accumulated savings, or by borrowing, but this practice only tends to further reduce demand, because it retards new investment, which is essential to continuous employment.

It would thus seem rather obvious that a general curtailment of production, with a view to maintaining prices in declining markets, is achieved at the expense of continuous real demand, growing out of production. Carried to its logical conclusion, adjusting production to demand through curtailment of production all along the line would not restore prosperity after a period of depression. It would rather lead to national impoverishment. The only thing that would be stabilized by adhering to such practices of restricting output would be poverty.

Since demand grows out of production, we should focus our attention on maintaining and stabilizing demand, rather than on stabilizing individual prices. Wider markets and lower prices, with a view to increasing effective demand, offer a powerful antidote to unemployment in many branches of industry. Moreover, unemployment compensation or deferred wage payments, popularly referred to as unemployment insurance, also help to maintain demand, and thus to encourage continuous production.

Reasonable assurance of continuity of buying power is an important item in continuous consumption, which is necessary if we

would stabilize production. People stop spending their money incomes, whether for consumers' or investment goods, when they are not certain that their incomes will continue. The quickest way to impoverish a whole nation is to have the people refuse to spend their money. The continuous flow of money into production and out of production is necessary to keep our economic system functioning smoothly and efficiently.

Whenever private enterprise is unable or unwilling to assume responsibility for high levels of employment, with a view to maintaining demand, government, no matter on which level, whether Federal, state or local, should be prepared to aid in providing socially productive employment, with a view to assuring real demand, which in the first instance derives from production. If we would seek to minimize post-war economic dislocations, we must constantly weigh our individual business policies in terms of their effects upon consumer demand, not only for our particular product or products, but for goods in general. As we broaden our economic vision and come to realize the full significance of the fact that demand grows out of production, we will think twice before adopting the shortsighted policy of restricting output, maintaining prices, increasing unemployment, decreasing demand, and hence restricting output still further. In our dynamic economy the individual business man has not always been able to interpret the effects of his business policy upon the economy as a whole. To offset a recurrence of restricted production, we may look to continued government or community guidance and direction in our post-war economy, with a view to maintaining high levels of employment and production, which are essential to maintaining real demand. The proper cooperative effort of both private and public enterprise will be needed, if we would not relapse into a post-war depression, which in one sense would merely be a continuation of the depression of the thirties. Unless we have learned that continuous high levels of demand for goods will require correspondingly high levels of employment and production, we will not have profited very much from the mistakes of the past.

SELECTED ABSTRACTS

The Present Status of Penicillin. A. E. Smith. *J. A. D. A. 31,* 790 (1944). In this review article the author first traces the discovery and early clinical usage of penicillin and describes the various methods of production which have been used.

The suggestion to include penicillin in the U. S. P. has led to attempts to provide satisfactory standards for the drug. It is expected that a crystalline sodium salt of penicillin with a potency of 1,650 Oxford units per milligram will be adopted as a reference standard.

The cup and the dilution methods are used as preliminary assays for potency; the assay for the final product is performed by a cylinder plate or cup method described by the FDA. Safety tests are conducted on mice, and pyrogen tests on rabbits. A moisture determination is also made. Storage and labeling requirements are provided.

In discussing the action and uses of the drug the author summarizes the report of Keefer and his associates and the review of Lyons. The removal of pyrogens in the product now available has reduced the incidence of toxic reactions to penicillin. The comparative actions of penicillin and the sulfonamides are briefly discussed.

Other antibiotics which have been studied include tyrothricin (actually a mixture of gramicidin and tyrocidin from cultures of *Bacillus brevis*), patulin (from *Penicillium patulum*), clavacin (from *Aspergillus clavatus,* and recently shown to be identical with patulin), streptothricin, fumagacin, actinomycetin, citrinin, pyocyanin, and gliotoxin.

Gold Salts in the Treatment of Rheumatoid Arthritis. (Editor.) *The Prescriber 38,* 21 (1944). The published reports on the administration of gold salts in rheumatoid arthritis indicate increasing confidence in this method of treatment.

A thorough physical examination of the patient should be made prior to gold therapy. This medication is contraindicated in the presence of albuminuria, and should this condition appear during the course of treatment the drug must be withheld for some weeks. Weekly examination of the urine should be performed. Local reactions such as skin eruptions are rare and are usually mild in character and of no significance.

The gold salt should be administered intramuscularly, preferably in an oily suspension. Oleo-"Novacrysin" (Napp), which consists of gold-sodium-thiosulfate in such a vehicle, is a proprietary product of this type. The initial dosage recommended for this therapy is 0.02 gm., gradually increased to approximately 0.25 gm. Some patients readily tolerate as much as 0.5 gm. Intervals of eight to ten days should be allowed between injections.

A German Sulphonamide. *Lancet,* May 13, 1944, p. 627; through *Pharm. J. 98,* 231 (1944). Supplies of a German sulfonamide called Marfanil were captured during the African campaign, thus permitting R. A. M. C. officers to test the claims made for the drug in the German literature since 1941.

Chemically, Marfanil is 4-aminomethylbenzene-sulfonamide, or benzylamine-*p*-sulfonamide, and was prepared by Domagk. According to German claims the drug is not inactivated by *p*-aminobenzoic acid which is always present in pus; it thus possesses an advantage over all other known sulfonamides. The English investigators have found the German claims to be substantially correct, and that penicillin alone gives better results than Marfanil. The new sulfonamide is particularly effective against anaerobes such as the gas-gangrene organisms.

Its synthesis has been described by E. Miller and co-workers. It may be prepared by the diazotization of sulfanilamide, treatment with copper cyanide, and subsequent reduction of the nitrile thus formed. It is a much stronger base than sulfanilamide, yielding a neutral hydrochloride which is very soluble in water and which is suitable for injection.

Thiourea and Thyrotoxicosis. T. I. Williams. *Chem. Products 7,* 52 (1944). Thyrotoxicosis, or Graves' disease, is caused by the excessive secretion of thyroxine. Although the administration of iodine has been found in many cases to give relief for a few weeks, this improvement is usually followed by a complete relapse.

It has been reported by Astwood and also by Himsworth that the administration of thiourea in an amount of one to two grams daily for several weeks relieves the symptoms of thyrotoxicosis to such an extent that the patient is able to resume his normal work, and the disfiguring goitre and exophthalmia become less marked. In contrast to the results obtained from iodine therapy, the relief appears to be permanent, providing that thiourea treatment is continued daily.

Similar results have been observed by Williams and Bissell following the administration of thiouracil. This drug possesses the advantage of being slightly more active and much more palatable than thiourea. It has been found that the sulfonamides and aminobenzoic acid also possess an antithyroid activity, though these substances have not been as yet employed clinically for this purpose.

It is believed that thiourea and thiouracil produce their effect by inhibiting the synthesis of thyroxine rather than by any chemical action between the drug and the hormone. This theory is supported by the observation that the simultaneous injection of thyroxine and thiourea into the body fails to impair the effect of the former.

Tadpoles from which the thyroid gland has been removed fail to undergo the normal metamorphosis into frogs; but they do so if they are then fed chopped animal thyroid, or if a little thiourea is added to the water in which they are living.

Onion Vapour. (Editor.) *Chem. Products 7,* 42 (1944). Following reports by Tokin that the essential oils of onions, garlic and certain other strong-scented vegetables contain volatile substances of unknown identity termed phytoncides which are capable of killing bacteria, protozoa, and even larger organisms, Toroptsev and Filatova investigated the use of onion paste as a dressing for infected wounds.

The paste was prepared by grinding the peeled onion and placing the ground material in a glass dish with a diameter equal to that of

the wound. The paste was applied in such a manner that it did not come into contact with the wound, which was exposed to the vapor for ten minutes.

Eleven patients were treated, comprising seven who had undergone amputation of the arm, one of the thigh, and three of the foot. All wounds showed purulent inflammation prior to treatment. Following the first treatment all the wounds became rose-colored and the patients no longer complained of pain. After the second treatment purulence and odor subsided. Extensive soft epithelialization was noted after five days.

The investigators feel that phytoncides have a place in the treatment of infected wounds along with such drugs as the sulfonamides.

Tests for Formaldehyde in Milk. D. W. Horn. Publication of the Wagner Free Institute of Science, Philadelphia, Pa. Vol. IV, Part I, 1944. This monograph is a revision of the testing for formaldehyde in milk. The limited supply of milk, incident to the war, seems to have called forth this almost forgotten evil.

Five tests have been critically compared. They are the "sulfuric acid-ferric sulphate test", the "hydrochloric acid-ferric chloride test", the "sulfuric acid-bromine test", the "leuco-fuchsin test", and the "phenyl hydrazine-sodium nitroprusside test". A comparison of the useful limits of each of these tests is shown upon a single diagram, which would enable a laboratory worker to cover all concentrations of formaldehyde down to the limit of the most sensitive of these tests. Of these five, the third test described, which is by far the most sensitive, has not been included in "Methods of Analysis of the Association of Official Agricultural Chemists" or in "Standard Methods for the Examination of Dairy Products of the American Public Health Association".

The procedure of comparing the tests is given in detail. Possible failures due to individual weaknesses of each test are discussed. At the end of the paper a table is given which is here reproduced.

TABLE I

APPROXIMATE LIMITS OF FIVE FORMALDEHYDE TESTS

Designations of the Tests	Limiting Indices (See diagram)		Limits of Sensitiveness (Parts milk containing 1 part "Liquor Formaldehydi U.S.P. XII")		Limits of Sensitiveness (Parts milk containing 1 part absolute Formaldehyde)	
	Min.	Max.	Min.	Max.	Min.	Max.
I. Ferric sulphate & Sulphuric acid	8	16	260	66,000	700	180,000
II. Ferric chloride & Hydrochloric acid	7	18	130	260,000	350	700,000
III. Bromine & Sulphuric acid	8	20	260	1,000,000	700	2,700,000
IV. Leuco fuchsin	1*	12	2†	4,100	5†	11,000
V. Phenylhydrazine & Nitroprusside	1*	9	2†	510	5†	1,400

* These numbers should be read: "Between zero index and unity."

† These numbers should be read: "In the most concentrated mixtures possible."

Incidentally, a system of following dilutions in small steps over a wide range is described along with suggestions as to its adaptation to any particular case that the chemist may have to deal with. In this system the dilution is directly deducible from the ordinal number of the test tube. A logarithmic scale of numbers is used.

SOLID EXTRACTS

Westinghouse Electric recently announced that the ten-millionth "insect bomb" had been produced for the armed services. These "bombs" are about one pound in size and cause the insecticide to be dispersed in a mist. Freon-12 is used to propel the insecticide from the container. Freon-12 is used also as a refrigerant in household electric refrigerators. Enough of this substance has already been used in insect bombs to operate 10,000,000 electric refrigerators.

AJP

A new method of inactivating bacteria and viruses in the preparation of vaccines has been announced. Ultraviolet light is used in treating thin layers of material. It has been observed that with the specific apparatus described 100 per cent inactivation was accomplished while maintaining a degree of antigenicity superior to that obtained with the usual methods employing heat or chemicals. Vaccines so prepared included rabies, St. Louis encephalitis, typhoid, and Salmonella enteritidis.

AJP

Containers for drugs or foods that melt easily should be light in color. Dark packages absorb heat and frequently cause the contents to melt.

AJP

Color vision is observed only in man, apes and monkeys. Other mammals are color-blind and even the bull is known to fail to detect the red color so commonly used to arouse his ire.

AJP

We learn from a recent study that nicotine causes constriction of blood vessels. This effect can be produced by the smoking of standard cigarettes. The authors even advise against giving a wounded soldier a cigarette if an injury to an artery is involved since arterial spasm and irreparable damage might result.

The soupfin shark is a strange war casualty. The war in closing off many foreign sources of vitamin A increased the demand for the livers of this particular species which is rich in vitamin A. Before the war sharks brought only about $500,000 a year to fishermen. In 1943 fishermen collected over $8,000,000 from this source. The problem today is a diminishing shark population due to the intensive fishing for them brought about by the current demand.

AJP

The medical profession is alarmed over the shortage of physicians that will result if the present government policy concerning medical students is continued. Pharmacy, too, has a problem in that practically no students are now in college to meet the continuing demand for pharmacists. A great deal of readjustment in the ranks of medicine and pharmacy will be needed in order to provide adequate service in the next decade.

AJP

A principle named Rutin has been extracted from "bright" tobacco which is useful in the treatment of capillary fragility associated with high blood pressure. The new principle has been extracted by chemists of the United States Department of Agriculture. It is a rhamno-glucoside of quercetin and it appears to be non-toxic. Its use apparently influences the walls of the capillaries so that the danger of hemorrhage is reduced in cases of arterial hypertension. The drug is generally combined with vasodilators with which it offers a real therapeutic advance.

AJP

The drug industry in America is operating at the highest level in history. Volume last year was $800,000,000, an increase of more than 55 per cent since the start of the war. Advertising in our field totals $75,000,000 annually. Reconversion to a peacetime schedule will probably cause less difficulty than in any other industry since the drug industry has not converted its facilities nor expanded production beyond the likely demand.

BOOK REVIEW

Hackh's Chemical Dictionary, Third Edition (1944). Edited by Julius Grant, M. Sc., Ph. D., F. R. I. C. The Blakiston Co., Philadelphia, Pa. 925 pages. Price: $12.00.

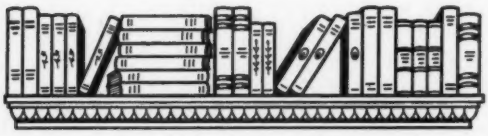
The third edition of this valuable volume is completely revised. The dictionary was originally conceived by Ingo W. D. Hackh, who passed away in 1938. He felt the need for a dictionary which would record the old and new phenomena in the terms of our new concepts of matter and energy.

This dictionary presents in clear and concise language theories, laws and rules. It describes the many elements, compounds, minerals, drugs, and vegetable and animal products. In addition there are listed chemical reactions, processes and methods as well as apparatus and the like. Various scientists who played a great part in the development of chemistry are also noted.

In this edition special care was devoted to balancing the treatment from the American and British points of view, a point which has always been important, but will be more so in the post-war world.

There are over 57,000 definitions included in this book. It is of value not only to the chemist but also to the pharmacist and related professional individuals. It is a valuable adjunct to any good scientific library.

M. O. HOLLAND.



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